Functional MR Imaging of the Human Sensorimotor Cortex After Toe-to-Finger Transplantation

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摘要

Abstract

BACKGROUND: A model of toe-to-finger transplantation has been used in studying peripheral nerve regeneration and central reorganization. It was found that recovery of sensory perception depends not only on peripheral reinnervation but also on central integrative mechanisms. OBJECTIVE: Our aim was to investigate functional changes of the brain and somatotopic representation of the transplanted toes after toe-to-finger transplantation. MATERIALS AND METHODS: Six patients who had toe-to-finger transplantation from 3 to 8 years earlier underwent motor and sensory functional MR imaging studies of transplanted toes and opposite corresponding normal fingers. The motor task was performed by repetitively tapping of the transplanted toe or finger against the thumb, whereas the sensory task was applied by tactilely stimulating the pulp of the transplanted toe or finger. RESULTS: The main activation areas from both types of stimulations were located in the expected location of the finger homunculus of the primary sensorimotor cortex. In addition, activated volumes from the transplanted toes were significantly greater than those from the opposite fingers (P = .017 for motor task and P = .005 for tactile sensory task, paired samples Student t test). CONCLUSIONS: Functional recruitment in the primary sensorimotor cortex seemed to have occurred following toe-to-finger transplantation. The transplanted toe was somatotopically represented in the hand area.